B.    The Economic Rationale for including low penetration systems

The second major mistake made by Professor Hazlett is to equate the low penetration standard in the act with the presence of an alternative multi-channel video substitute. He reports that ". . . low penetration rates found in these systems are attributable to factors other than the presence of competing multi-channel video service providers." (p. 3 ) Later, in discussing the results of his survey of low penetration systems, he reports that ". . . there is no evidence that competition in the multi-channel video market is a factor." (p. 8) Professor Hazlett seems to have missed the rationale behind putting the low penetration systems in the effective competition category.

The logic of including low penetration systems in the effective competition category is not that low penetration is necessarily explained by competing multi-channel vendors. There is, of course, a separate category of effective competition for that in the Act. The economic logic for including low penetration systems is quite different.

It is well known that, as a matter of economic theory, actual direct competitors are not required to generate a competitive result.[10] The ability of firms that face relatively elastic demand to raise price above marginal cost (that is, exercise market power) is limited. Tastes and substitutes can explain elastic demand. These factors explain why the statute classifies low penetration firms in the effective competition category.

As discussed above, Professor Hazlett claims to have identified a number of variables that lead to low penetration, including low income and an elderly population. Assuming

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[10]  See Scherer and Ross, Industrial Market Structure and Economic Performance (3d ed. 1990) pp. 70-71.

these factors are significant, demand for cable service is likely to be quite elastic. Low penetration may also be the result of the presence of many over-the-air signals in markets with good over-the-air reception. In these cases, low penetration can be explained by the presence of good substitutes for cable service.[11] For example, Continental Cablevision reports that it observes low penetration in the Los Angeles area due to the availability of a substantial number of over-the-air signals.[12] Therefore, the conclusion that "Type A [low penetration] systems are not competitive in any relevant economic sense" (p. 3) is incorrect.

II.    PROFESSOR HAZLETT'S ANALYSIS ILLUSTRATES THE PROBLEMS WITH TIER NEUTRAL REGULATION

Professor Hazlett has identified variables that may be important in explaining the rates for low penetration systems. Other parties have suggested problems with other facets of the Commission's modeling efforts. These include improper aggregation and averaging, failure to correct for biases induced by the form of variables, etc.[13]

As discussed above, correcting problems with the regression model used to generate benchmark rates may improve the results, and this effort should be undertaken. However, no benchmark will be perfect.[14] It is unreasonable to expect that a perfect specification of a benchmark model can be constructed. Therefore, there will be imprecision in the results leading to misclassification of firms. Perhaps the best that can be said for benchmark

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[11] A number of the low penetration systems are in or around large cities, where a large number of over-the-air signals might be found.

[12] See Comments of Continental Cablevision, Inc., pp. 6-9.

[13] See the references cited in note 6, *supra*.

[14] See "Economics of Cable Television Regulation," *supra*, note 2.

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regulation of cable systems, even if corrected, is that it is superior to the cost of service alternative.

As discussed in more detail elsewhere, separate benchmarks for basic and cable programming services, with built in safety valves, will mitigate many of these problems.[15] The negative implications of the inherent imprecision of statistical analysis can be reduced by providing for a zone of reasonableness for basic service rates. A cable programming service benchmark based on a zone of reasonableness around the average for the random sample firms would be more appropriate because it reduces the amount of mistargeting of systems

basic service, together with a cable programming rate standard designed to prevent instances of clearly unreasonable pricing, will reduce the enforcement difficulties.

III.    CONCLUSION

Professor Hazlett has provided some effective criticisms of the Commission's benchmark methodology. That low penetration systems are used in the formulation of benchmark rates is not one of them. To the extent the higher average rates for low penetration systems flow from exogenous demographic variables, these variables should be included in the analysis.

# ECONOMETRIC ISSUES RAISED BY THE FURTHER NOTICE

Prepared for

## Time Warner Entertainment Company, L.P.

By

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**National Economic Research Associates, Inc.**

July 1, 1993

## I.    INTRODUCTION

We have reviewed four submissions to the FCC in response to the Further Notice and one submission included as part of a petition for reconsideration that address points raised in our initial comments.[1] Based on this review, we amplify four general points:

First, CFA and NATOA suggest excluding certain competitive groups from the competitive benchmark because they differ from the "noncompetitive" group on cost-related factors. To the extent that these factors are already accounted for in the FCC model, this point is without merit. To the extent that important cost factors have been omitted, the model itself should be changed to incorporate them.

Second, Hazlett and NATOA suggest limiting the competitive benchmark to the private and municipal overbuild groups and CFA suggests limiting it to the private overbuild group alone. Each of these competitive benchmarks makes the FCC model inconsistent, whereas the inclusion of all three competitive groups in the benchmark does not.

Third, CFA and Hazlett use average prices to compare various competitive and "noncompetitive" groups. Hazlett concludes that the low penetration group has high prices, on average, relative to the "noncompetitive" group and, therefore, should be excluded from the competitive benchmark. This is inappropriate because averages do not control for factors known to affect price. Despite its shortcomings, the FCC model is inherently superior to an averaging method because it controls for differences due to subscribers, channels and satellite channels. After adjustment for these factors, the low penetration group does not have high prices relative to the "noncompetitive" group.

Fourth, Besen and Economists Inc. confirm our conclusion that the competitive effect varies widely by system size, although we each use different size groups. The model should be

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[1]    The submissions in this proceeding are: "Data Analysis of Consumer Federation of America," March 8, 1993, submitted with the Comments of Consumer Federation of America ("CFA"); Further Comments of the National Association of Telecommunications Officers and Advisers, United States Conference of Mayors and the National Association of Counties ("NATOA"); Affidavit of Thomas W. Hazlett, June 16, 1993, submitted with the Joint Comments of Bell Atlantic, GTE, and the NYNEX Telephone Companies ("Hazlett"); Stanley M. Besen and John R. Woodbury, "An Analysis of the FCC's Cable Television Benchmark Rates," June 17, 1993, submitted with the Comments of Tele-Communications, Inc. ("Besen"); and Lewis J. Perl, Linda McLaughlin, Jonathan Falk, "Econometric Analysis of the FCC's Proposed Competitive Benchmarks," June 16, 1993, submitted with the Comments of Time Warner Entertainment Company, L.P. ("June 16 Study"). We also reviewed Economists Incorporated, "The Effect of 'Competition' on Rates Differs for Large and Small Cable Systems," submitted with the Petition for Reconsideration of the National Cable Television Association, Inc., June 21, 1993 ("Economists Inc.")

Points which we do not address imply neither approval nor disapproval of the comments in these or other submissions.

improved to correct this serious specification problem. Alternatively, if this problem remains, the model might be estimated separately for optimal size groups or the regression might be weighted by system size to minimize the problem's impact.

## II. DIFFERENCES BETWEEN EFFECTIVE COMPETITION GROUPS AND THE "NONCOMPETITIVE" GROUP

CFA concludes that both the low penetration group and the municipal overbuild group should be excluded because they are dissimilar to the "noncompetitive" group on various "cost-causative" characteristics, while the private overbuild group is "much more similar."[2] NATOA concludes that the low penetration group should be excluded because it contains more small-size, high-cost systems.[3]

Such comparisons raise two questions: First, should the benchmark model include additional cost-related variables? Second, if the competitive benchmark were limited to one or both overbuild groups, is the current FCC model consistent?

### A. Additional Cost-Related Variables

NATOA focuses on system subscribers, a factor already included in the FCC model.[4] NATOA is correct in stating that the FCC found smaller systems have higher prices per channel. As we noted in our initial comments, the model predicts that systems with fewer than 1,000 subscribers will charge about 2 percent more per channel than systems with over 10,000 subscribers, all other things equal.[5] However, NATOA misunderstands the way the regression considers this factor. The regression determines how low penetration (and other competitive) franchise prices differ from those of "noncompetitive" franchises after accounting for price differences due to system size, channels and satellite channels. Thus, contrary to NATOA's concern, the price differences the FCC found due to system size differences are not attributed to the competitive effect.

CFA's comparison focuses on system subscribers (already included in the FCC model) and other factors not included in the FCC model: households passed, percent of cable below ground, miles

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[2]   CFA, pp. 6-10.

[3]   NATOA, pp. 8-10. Although NATOA describes its comparison in terms of franchise subscribers, the data they report suggest that they actually compared the system subscribers of the different competitive groups.

[4]   While the effect of system subscribers may be poorly specified, it is certainly present in the calculation of the benchmark.

[5]   June 16 Study, p. 7.

of cable in area, number of head ends and system age. Since these factors are available in the FCC survey data, there is no need to exclude the low penetration and municipal overbuild groups due to any differences in these cost-related factors. If these factors matter, the model should be corrected to include them. A well-specified regression will pick up those characteristics that lower or raise cost and adjust the benchmark accordingly. In this way, prices that are the result of low- or high-cost characteristics will not be mistaken for competitive effects.

B.    Homogeneity in the FCC Model

In our initial comments, we noted that the relationship between price and the franchise characteristics included in the FCC model is quite different between the private and municipal overbuild groups combined and the "noncompetitive" group. We concluded that it would be inappropriate to use only the private and municipal overbuild groups as the competitive benchmark in a unified model with the FCC specification. This statistical problem does not occur when all three competitive groups are included in the competitive benchmark.[6]

CFA suggests using the private overbuild group alone as the competitive benchmark. We tested whether this group exhibits structural homogeneity with the "noncompetitive" group using the FCC's model. We find that it does not.[7] Thus, it also would be inappropriate to use only the private overbuild group as the competitive benchmark with the FCC's specification.

## III.  THE USE OF AVERAGES TO DRAW CONCLUSIONS

Both CFA and Hazlett use the difference in average prices per channel to draw conclusions about the competitive effects of various groups.[8]    The FCC has correctly chosen a more discriminating comparison method. Regression analysis is essentially a technique to compute averages after accounting for relevant differences.[9] Failure to take account of these differences leads to averages which are simply misleading.

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[6]    June 16 Study, pp. 2-3 and Appendix Tables 3 and 4.

[7]    See Appendix, Table 1.

[8]    CFA, p. 3-6; Hazlett, pp. 5-7 and Table 2.

[9]    As Economists Inc. notes, because the FCC chose a logarithmic functional form, the resulting predicted benchmarks are not averages (i.e., means) but medians (Economists Inc., p. 3, footnote 4). As Dertouzos and Wildman explain, the predicted logarithms of price per channel can be transformed into average price per channel benchmarks by adding a small corrective factor to the current benchmarks (James Dertouzos and Steven Wildman, "Regulatory Benchmarks for Cable Rates: A Review of the FCC Methodology," June 21, 1993, pp. 17-19, submitted with the "Petition for Reconsideration and Clarification of Viacom International Inc., June 21, 1993).

The importance of controlling for subscribers and channels can be illustrated by comparing the explanatory power of a regression that mirrors the averaging method used by CFA and Hazlett with that of the FCC regression. The "average" regression tries to explain price per channel based only on the franchise's competitive group (i.e., low penetration, private overbuild, municipal overbuild or "noncompetitive"). It accounts for only 17 percent of the variation in price per channel. In contrast, the FCC model explains 63 percent of the variation in price per channel because it includes subscribers, channels and satellite channels as well as whether the franchise is competitive according to the statutory definitions.[10] Thus, the inclusion of these added variables allows us to refine our estimates of the competitive effects. To ignore them is inappropriate.

The FCC model shows that the average price per channel for the low penetration group is about the same as for the "noncompetitive" group after adjustment for price differences due to system size, channels and satellite channels.[11] Hazlett's statement that prices of low penetration systems are higher on average than "noncompetitive" systems[12] is misleading. When the low penetration franchises are included in the competitive benchmark they are not treated as high-priced because the FCC simultaneously controls for price differences due to subscribers and channels.

## IV. THE INSTABILITY OF THE COMPETITIVE EFFECT

Our initial comments and those of Besen and Economists Inc. focus on the instability of the competitive effect by system size. We explored one system-size division: above and below 10,000 subscribers. Economists Inc. use a different break point: above and below 5,000 subscribers; Besen uses five GAO size categories.[13]

The fact that these different size categories lead to varying estimates of the competitive effect reinforces a central point: The FCC model is severely misspecified with respect to system size. The primary question of the Further Notice, whether low penetration franchises should be included

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[10] *Order*, Appendix E, ¶ 28.

[11] See Appendix, Table 2. The price of the low penetration franchises is estimated to be approximately 1 percent below the "noncompetitive" franchises. This estimate is not significantly different from zero, that is, the price of the low penetration franchises is not significantly different from the "noncompetitive" franchises.

[12] Hazlett, pp. 5-7 and Table 2.

[13] Economists Inc., pp. 1-6; Besen, pp. 21-26 and 32-34. Economists Inc. also show the effect of the FCC's eight size categories, pp. 6-7 and Chart 2.

in measuring the competitive effect, is really unanswerable until the FCC addresses this misspecification.

The best solution is to improve the model so that it exhibits standard homogeneity across system size groups by adding additional variables and altering the functional form. If the FCC model is not changed, both we and Economists Inc. conclude that it is more appropriate to estimate the competitive effect separately for large and small systems than to estimate a single effect for all system sizes.[14] The various divisions raise the question of how such a separation should be accomplished.

There are two principles to guide the division into subgroups: the subgroup members should be (1) as similar as possible to one another and (2) as different as possible from other subgroups. The first principle implies that groupings which have significantly different structural parameters should be separated. The second principle implies that where structural homogeneity cannot be rejected, the groups should be merged. The five subgroup divisions shown by Besen do not pass the latter test.[15] For example, the 10,000-50,000 subscriber subgroup is not different from the above 50,000 subscriber subgroup.[16] There are, of course, a large number of possible ways to split the data into subgroups. While these principles reject many of them, finding an optimal set of subgroups may be a difficult task.

An alternative method to deal with the homogeneity problem is to weight the regression by system subscribers to ensure that the specification error has as little public policy impact as possible.[17]

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[14] Economists Inc., p. 7; June 16 Study, p. 3 and Lewis J. Perl, Linda McLaughlin and Jonathan Falk, "Econometric Assessment of the FCC's Benchmark Model," June 18, 1993, submitted with the Petition for Reconsideration of Time Warner Entertainment Company, L.P., June 21, 1993, p. 2 ("June 18 Study").

[15] We note that Besen apparently did not intend that his results be used to estimate the competitive effect, but only to show the wide variability of the competitive effect for different system sizes.

[16] See Appendix, Table 3.

[17] We also suggested this method in our June 16 and 18 Studies.

# APPENDIX

n/e/r/a

TABLE 1

## Chow Test
## Private Overbuild Group and "Noncompetitive" Franchises
## FCC Model

| Source | SS | df | MS | | | |
|--------|-----|-----|-----|---|---|---|
| Model | 29.5626002 | 7 | 4.22322861 | | | |
| Residual | 7.74787779 | 284 | .02728126 | | | |
| Total | 37.310478 | 291 | .128214701 | | | |

| | | | | | |
|---|---|---|---|---|---|
| Number of obs | = | 292 |
| F( 7, 284) | = | 154.80 |
| Prob > F | = | 0.0000 |
| R-square | = | 0.7923 |
| Adj R-square | = | 0.7872 |
| Root MSE | = | .16517 |

| lnp | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] | |
|-----|-------|-----------|---|-------|------|------|
| _cons | 2.444823 | .5864898 | 4.169 | 0.000 | 1.290405 | 3.599241 |
| bdummy | | | | | | |
| 1 | -.0318942 | .5980155 | -0.053 | 0.958 | -1.208999 | 1.145211 |
| 2 | (dropped) | | | | | |
| recipsub*bdummy | | | | | | |
| 1 | 5.036922 | 2.731035 | 1.844 | 0.066 | -.3387162 | 10.41256 |
| 2 | -6.742094 | 16.41986 | -0.411 | 0.682 | -39.06217 | 25.57798 |
| lnchan*bdummy | | | | | | |
| 1 | -.8149157 | .0502433 | -16.219 | 0.000 | -.9138123 | -.7160192 |
| 2 | .1319497 | .3484226 | 0.379 | 0.705 | -.5538687 | .817768 |
| lnsat*bdummy | | | | | | |
| 1 | .0240309 | .0331828 | 0.724 | 0.470 | -.0412845 | .0893464 |
| 2 | -1.120576 | .3190934 | -3.512 | 0.000 | -1.748664 | -.4924878 |

Test

( 1)  abc[1]*recipsub - abc[2]*recipsub = 0.0
( 2)  abc[1]*lnchan - abc[2]*lnchan = 0.0
( 3)  abc[1]*lnsat - abc[2]*lnsat = 0.0

$$F( 3, 284) = 4.67$$
$$Prob > F = 0.0033$$

Note:
  Lines 1 represent "noncompetitive" group.
  Lines 2 represent private overbuild group.

Observations exclude apparent errors in FCC data
shown in June 16 Study, Appendix Note.

TABLE 2

## FCC Model
### Separate Low Penetration and Overbuild Competitive Effects

```
  Source |       SS          df        MS               Number of obs =      367
---------+------------------------------------           F(  5,    361) =   281.96
   Model |   43.692643        5    8.7385286             Prob > F       =   0.0000
Residual |   11.1879452     361   .030991538             R-square       =   0.7961
---------+------------------------------------           Adj R-square   =   0.7933
   Total |   54.8805882     366   .149946962             Root MSE       =   .17604
```

```
-----------------------------------------------------------------------------------
     lnp |    Coef.     Std. Err.        t      P>|t|       [95% Conf. Interval]
---------+-------------------------------------------------------------------------
  adummy | -.0078033    .0260944      -0.299     0.765      -.0591194      .0435128
 bcdummy | -.2713771    .0292919      -9.265     0.000      -.3289814     -.2137728
 recipsub|  5.737688    1.829357       3.136     0.002       2.140152      9.335223
  lnchan | -.804581     .0466678     -17.241     0.000       -.896356     -.7128061
   lnsat |  .0336322    .0331932       1.013     0.312      -.0316442      .0989085
   _cons |  2.350846    .1027967      22.869     0.000        2.14869      2.553002
-----------------------------------------------------------------------------------
```

Note:
   Observations exclude apparent errors in FCC data
   shown in June 16 Study, Appendix Note.

TABLE 3
Page 1 of 2

Chow Test
Three Subscriber Size Groups: Below 10,000, Between 10,000 and 50,000, and Above 50,000
FCC Model Using Broad Competition Definition

```
   Source |       SS       df       MS              Number of obs =      367
----------+--------------------------------         F( 12,   354) =   104.39
    Model | 42.7886904    12   3.5657242            Prob > F      =   0.0000
 Residual | 12.0918978   354   .034157903           R-square      =   0.7797
----------+--------------------------------         Adj R-square  =   0.7722
    Total | 54.8805882   366   .149946962           Root MSE      =   .18482
```

| lnp | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| _cons | 2.662493 | .1188452 | 22.403 | 0.000 | 2.428762 | 2.896225 |
| sizeg*abc | | | | | | |
| 1 | -.1698301 | .0272692 | -6.228 | 0.000 | -.2234602 | -.1162 |
| 2 | -.0247042 | .0492288 | -0.502 | 0.616 | -.1215219 | .0721134 |
| 3 | -.0594749 | .0576466 | -1.032 | 0.303 | -.1728478 | .053898 |
| sizeg*recipsub | | | | | | |
| 1 | 6.766251 | 1.949521 | 3.471 | 0.000 | 2.932152 | 10.60035 |
| 2 | -1551.745 | 1002.173 | -1.548 | 0.122 | -3522.707 | 419.2176 |

TABLE 3
Page 2 of 2

Chow Test
Three Subscriber Size Groups: Below 10,000, Between 10,000 and 50,000 and Above 50,000
FCC Model Using Broad Competition Definition

Test

( 1)   sizeg[1]*abc - sizeg[2]*abc = 0.0
( 2)   sizeg[1]*recipsub - sizeg[2]*recipsub = 0.0
( 3)   sizeg[1]*lnchan - sizeg[2]*lnchan = 0.0
( 4)   sizeg[1]*lnsat - sizeg[2]*lnsat = 0.0

       F( 4, 354) =   3.61
           Prob > F =   0.0067

Test

( 1)   - sizeg[2]*abc + sizeg[3]*abc = 0.0
( 2)   - sizeg[2]*recipsub + sizeg[3]*recipsub = 0.0
( 3)   - sizeg[2]*lnchan + sizeg[3]*lnchan = 0.0
( 4)   - sizeg[2]*lnsat + sizeg[3]*lnsat = 0.0

       F( 4, 354) =   0.96
           Prob > F =   0.4272

Note:
   Lines 1 represent systems with subscribers below 10,000.
   Lines 2 represent systems with subscribers between 10,000 and 50,000.
   Lines 3 represent systems with subscribers above 50,000.

   Observations exclude apparent errors in FCC data
   shown in June 16 Study, Appendix Note.